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WHAT'S THE FUSS ABOUT FROGS?

Now you see them. Now you don't. Such is the game frogs seem to be playing with herpetologists (scientists who study amphibians) worldwide. Except that this game is not fun.

The gastric brooding frog, for example, was first discovered in 1973 in a small area of the Australian rain forest. “The frog had the most amazing method of reproduction,” says James Hanken, professor of herpetology at Harvard University in Cambridge, MA. After mating, the female ate her fertilized eggs and incubated as many as 25 young in her stomach. After several weeks, she burped or vomited up tiny, fully formed frogs.

Although the brooding frog was never very common, scientists could always locate them. Then, about 1981, the species completely disappeared. “People don't know what happened, to this day,” says Hanken. “Some people suspect that it may have been the result of a disease, but no one knows for sure.”

Mysterious disappearing-frog stories like this are being heard all over the world. But not just frogs are disappearing: All forms of amphibians are on the decline, including toads, newts, salamanders, and a legless variety known as caecilians.

Canary in the Environmental Coal Mine

Amphibians occupy an important position in the community ecology for many reasons, says Hanken.

First, they are a significant food source for other vertebrates such as snakes, birds, and small mammals. Plus, they eat insects such as mosquitoes, providing a natural pest control.

Amphibians also slow the greenhouse effect by eating the insects that normally contribute to decomposition of the forest floor, says Dr. Richard Wyman, executive director of the Edmund Niles Huyck Preserve and Biological Research Station in Rensselaerville, NY.

But perhaps the biggest reason for paying attention is that they are the canary in the ecological coal mine, says Wyman. Coal miners used to carry canaries into the mines to warn of poison gases or lack of oxygen. If a canary died, then the men knew that they had to get out quickly.

Amphibians are the environment's warning signal. They are great indicators of what is going on in ponds, forests, the soft, and even the air, says Wyman. Many live their lives on both water and land and are more sensitive to the degradation of their environment than other animals because of their thin, porous skin, which absorbs pollutants directly into their bodies.

“They are tipping us off that we are starting to poison our environment,” says Hanken. “Ultimately, these poisons will affect other organisms, including humans, as well.”

Scientific Detective Work

To assess the problem, the World Conservation Union organized the Declining Amphibian Populations Task Force (DAPTF) in 1991. This international SWAT team of 3,000 scientists has more than 100 working groups located in 90 countries. For ten years, these scientists sought answers to: Are amphibians really declining? If so, to what extent? What is causing the decline? What can we do about it?

“We have both good news and bad news,” says Hanken. “The good news is that we know much more than we did about amphibians all over the world, and what is causing the decline. The bad news is that the problem is a lot worse than we expected. In fact, many more species are declining than we originally suspected, including those that were once abundant and common.”

Hanken predicts that between one-third and two-thirds of the world's species of amphibians are on the decline. Several went extinct within just the last few decades (see sidebar).

A Polluted Mixture

Several of the causes for decline identified by biologists include climate change, habitat deforestation, pesticides, disease, and introduced species.

Unfortunately, few of these factors act alone. Several combined simultaneously can devastate a specific amphibian, such as in the case of the golden toad of Costa Rica.

“This was such a spectacular species,” says Hanken, “that they were the symbol for the country.” The males were flaming golden orange. The female ranged in color from dark olive to black with splotches of bright red edged in yellow. “During breeding season, hundreds of toads gathered around pools deep in

the cloud forest," Hanken continues. Then, one year in the late 1980s, herpetologist Martha Crump was able to find only two frogs throughout the whole park. The next year, she found none. As in the case of the gastric-brooding frog, their disappearance is also a mystery, because nothing obvious appears to have been wrong.

After years of studying the problem, scientists have a theory. They found that the rainfall pattern changed right around the time of the frogs disappearance, says Hanken. Due to deforestation, global warming, and El Niño, the amount of rainfall, clouds, and humidity declined drastically. "When we talk about global warming, we are talking about only a fraction of a degree over a year," says Hanken, "but this is still enough to change local climate."

A Success Story

Once biologists know the cause, sometimes they are able to find solutions. Over the years, California Fish and Game (CF&G) stocked the high-altitude lakes in the Sierra Nevada Mountains with trout. Trout don't normally live here, because these lakes are too cold for the fish to breed. But every spring, CF&G flies over and drops the trout from planes for local and touring anglers to fish. "We found a tight correlation between amphibian decline and released trout," says Hanken, because the fish eat the frog eggs as well as tadpoles.

So CF&G, along with the U.S. Park Service, started a scientific pilot study to stop stocking certain high-altitude lakes and see what would happen. In some lakes, anglers even removed all of the trout. The result? The frogs are coming back!

"In this case, the problem was easily discovered and reversed," says Hanken.

For more difficult situations, researchers are breeding endangered frogs in captivity. The Detroit Zoo in Michigan set up a special facility just for this purpose. "If we can maintain a population of amphibians in captivity, then perhaps in the future, when their habitat has been stabilized, we can reintroduce them into the wild," says Hanken.

You Can Help

There are so many different types of amphibians in the world that biologists can't monitor them all. If you want to help, Hanken suggests getting involved with the amphibian census. People can join the North American Amphibian Monitoring Project (NAAMP) and volunteer to listen to frogs during the breeding season, "We want to count the number of sites, or ponds where we hear the frogs calling during mating, and try to determine how many frogs there are," Hanken says.

Volunteers help herpetologists identify the type and number of frogs and toads in an area, determine if the amphibians are breeding, and try to gauge what is happening to that population from year to year. From this information, scientists are alerted to changes in numbers. If there is a decline, they will try to determine the cause and, hopefully, stop or reverse the process (see Fantastic Journeys, page 46).

By conserving natural resources, we slow global warming, which in turn may stop and even reverse this

decline. With help from us all, maybe the herpetologists of tomorrow can play “Now you see them” for fun.

El niño — A warming of the ocean surface off the western coast of South America that occurs every 4 to 12 years

PHOTO (COLOR): The Mississippi gopher frog (Rana capito sevosa) was added tot he Endangered Species List last year. Only about 100 of these small (7 cm) frogs, whose music once filled the night air of the rural South, are left in the wild.

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